

## WHAT IS CLAIMED IS:

1. A radio frequency (RF) coil assembly for a very high field Magnetic Resonance Imaging (MRI) system comprising:

a plurality of conductors arranged cylindrically and disposed about a patient bore tube of the MRI system, said conductors having a width selected for said RF coil assembly to resonate at substantially high frequencies; and,

a plurality of capacitive elements for electrically interconnecting said plurality of conductors at respective ends of said conductors.

2. The RF coil assembly of claim 1 wherein the width of the conductors is selected in accordance with:

$$w_{\max} = 2\pi * A / N$$

where  $w_{\max}$  is the maximum width, A is the outer diameter radius of said patient bore tube and N is the number of said conductors.

3. The RF coil assembly of claim 1 wherein said substantially high frequencies occurs in a range between about 64MHz to about 500 MHz.

4. The RF coil assembly of claim 2 wherein said width is about 7.9 cm, and said number of conductors is 16.

5. The RF coil assembly of claim 1 wherein said very high field MRI system produces a magnetic field of about 3 Tesla (3 T).

6. The RF coil assembly of claim 1 wherein said plurality of conductors have a selectable length.

7. The RF coil assembly of claim 6 wherein said selectable length is about 55 cm.

8. The RF coil assembly of claim 1 wherein said capacitive elements are low inductance end ring capacitors.

9. The RF coil assembly of claim 1 wherein said conductors further include segmented slots for reducing eddy currents induced by gradient coils of said MRI system.

10. The RF coil assembly of claim 1 further comprising a plurality of gaps disposed between said conductors.

11. A very high field Magnetic Resonance Imaging (MRI) system comprising:

a radio frequency (RF) coil assembly adapted to resonate at substantially high frequencies;

a RF coil shield assembly adapted to reduce the inductance of the conductors contained within the RF coil assembly; and,

a RF drive cable assembly adapted to electrically connect to the RF coil assembly.

12. The MRI system of claim 11 wherein said substantially high frequencies occur in a range of about 64 MHz and about 500 MHz.

13. The MRI system of claim 11 wherein said very high field MRI system produces a magnetic field of about 3 Tesla (3 T).

14. The MRI system of claim 11 wherein said RF coil assembly comprises:

a plurality of conductors arranged cylindrically and disposed about a patient bore tube of the MRI system, said conductors having a width selected for said RF coil assembly to resonate at substantially high frequencies; and,

a plurality of capacitive elements for electrically interconnecting said plurality of conductors at respective ends of said conductors.

15. The MRI system of claim 11 wherein said plurality of conductors and plurality of capacitive elements are adapted to form a band pass RF coil assembly configuration.

16. The MRI system of claim 11 wherein said plurality of conductors and plurality of capacitive elements are adapted to form a low pass RF coil assembly configuration.

17. The MRI system of claim 11 wherein said plurality of conductors and plurality of capacitive elements form a high pass RF coil assembly configuration.